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NICARAGUA CANAL

Report on Prospective Tonnage of Traffic.

PRESENTED BY

THE

Nicaragua Canal Construction Co.,

WARNER MILLER, President,

44 WALL STREET,

NEW YORK.

1890.

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The Maritime Canal of Nicaragua.

REPORT ON THE TONNAGE OF TRAFFIC.

The question of the amount of traffic which will be attracted to any inter-oceanic canal across the American Isthmus, is one concerning which there has been, and probably will continue to be, a wide difference of opinion.

The problem is unquestionably an intricate one. It is difficult to determine the relative value of the factors of which it is composed; and it is made more complex by the element of futurity which enters into it.

The most serious attempt at its solution was made for the information of the International Congress, which assembled at Paris in 1879 to consider the various projects at that time before the public for an inter-oceanic canal across the Isthmus and the questions pertinent thereto. The question was then made the subject of careful investigation and study by a statistical commission composed of eminent scientists, statisticians and officials, of which M. Levasseur, member of the "Institute National" of France, was chairman.

In the report at the time presented by M. Levasseur, it was estimated upon premises set forth at some length, and which further on shall have more particular consideration, that the tonnage of traffic existing in 1876, within the zone of attraction of such a canal, upon the basis of an estimated average value per ton, was - - - - - - - - 5,268,000 tons.

Upon a statistical basis, partly furnished by Rear Admiral Ammen, U. S. N., and Mr. Eli Lazard of San Francisco, it was also estimated at - - - - - 4,833,000 tons.

Both estimates being duly considered, 5,250,000 tons was finally accepted by the commission as a "very moderate" estimate of the tonnage existing in 1878 within the zone of attraction.

In arriving at this conclusion the commission justly remarked: "Whatever may be the latitude at which the American Isthmus may be pierced between Lake Nicaragua and the Atrato, under whatever technical conditions the canal may be constructed, the commerce of the two oceans, considered as a whole, will profit equally by it."

From these results, thus arrived at, it was argued in the report that the natural growth of commerce would, in ten years' time, say, by 1888, increase the total of tributary tonnage from the 5,250,000 tons, recognized as existing in 1878, to 7,250,000 tons, from which the canal, at the time of its expected completion, would be able to draw for its revenue

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At the time when the report was prepared and submitted, the statistics of international commerce were neither as abundant nor as accessible as they are at the present time; even now they are not by any means as complete as is desirable for an exact examination of the question. South American returns of tonnage are particularly misleading; oftentimes the same vessel is registered in more than one port of the same country, and thus is made to count twice or more times in the tonnage reports of registered entries and clearances. The only traffic data of those countries, of reliability, are the values of exports and imports, which, from the channel through which they are collected—customs returns—are not apt, at all events, to be exaggerated.

In making a new estimate, it is, therefore, not only expedient, but almost imperative, to follow the method adopted by M. Levasseur and his eminent associates in their work, and in doing so it is somewhat remarkable how fully the growth of commerce has verified their anticipations. This estimate of a time so long passed is chiefly valuable for comparison, as indicating what growth of commerce may be anticipated in the lapse of time required for construction of the Nicaragua Canal, and it is of some importance in that respect to ascertain as nearly as possible the correctness of the premises with which comparison is to be made.

Accepting the report of the commission as a fair estimate of tributary commerce existing in 1878, we have 5,250,000 tons as a basis for comparison.

In an estimate furnished the United States Treasury Department in 1880, it is claimed that the meridian of 110° East from Greenwich will be the dividing line beyond which the attraction of the canal will cease to be influential. We are not prepared to admit this, for the reason that ocean currents and prevailing winds and more favorable climate will at least influence much of the trade of Europe to circumnavigate the globe by way of the Nicaragua Canal, when it is opened, as a return route, rather than to use the Suez Canal both going and returning; and thus the attraction of the canal will be felt to a greater or less extent even by the enormous trade of Europe, or more exactly speaking, of England with India. This principle seems to have been accepted by the Statistical Commission. Adopting for the purpose of an estimate the dividing line suggested, the meridian of 110° East from Greenwich, the commerce of the world which would have been directly subject to the attraction of the canal in 1888, had it then existed, is largely shown in the following table, carefully compiled from official returns.

It is proper to premise, 1st, That, as previously stated, the most reliable statistics of commerce are given in values and not in bulk or weight; where it is otherwise, the fact is noted. 2d, That wherever local statistics are accessible they are accepted as the more reliable; in other cases, the figures of the British Board of Trade are accepted. 3d, That as returns are made in different currencies they are roundly converted into dollars at $5 for the £ sterling, 20 cents for francs, 40 cents for guilders, 75 cents for pesos, $1.15 for Haikwan taels, 25 cents for

marks, $1 for the Yen of account, 20 cents for pesetas. These figures do not vary materially from actual values, and are very much more convenient for computation. 4th, In the instance where returns are made in bulk, they are reduced to tons at the round allowance of 1,000 kilos to the ton.

TABLE OF

COMMERCE SUBJECT TO THE ATTRACTION OF THE CANAL

To be Divided Into Three Classes:

Class 1—Entirely Tributary.
Class 2—Largely Tributary.
Class 3—Partially Tributary.

COMMERCE OF THE PLACES NAMED, EXPORTS AND IMPORTS.

With Great Britain.

	CLASS.		
Y. B., 111	2.	Hong Kong, 114° East from Greenwich,	$20,508,000
" 235	2.	New South Wales,	83,932,800
" 261	2.	Queensland,	23,655,480
" 268	2.	South Australia,	24,998,480
" 286	2.	Victoria,	73,606,350
" 292	2.	Western Australia,	3,380,850
" 253	2.	New Zealand,	44,564,000
" 275	2.	Tasmania,	3,608,010
" 776	3.	Java,	22,358,760
" 944	2.	Philippine Islands,	14,394,690
" 416	2.	China,	54,157,657
" 715	2.	Japan,	37,403,580
" 452	1.	Equador,	2,489,910
" 809	1.	Peru,	15,245,870
" 387	1.	Bolivia,	1,267,830
" 406	2.	Chili,	62,437,161
" 78	2.	Central America,	10,412,250

With France.

	CLASS.		
" 515	2.	New Caledonia,	$1,565,812
" 715	2.	Japan,	17,761,441
" 406	2.	Chili,	7,857,430

With Germany.

	CLASS.		
" 546	2.	Australia,	$8,129,000
" 715	2.	Japan,	6,878,462
" 406	2.	Chili,	14,098,930
" 577	2.	Hamburg with Australia; value not reported; weight, 65,300-000 kilos; say about 65,300 tons,	

	CLASS.		
S. Y. B., 416	3.	China with Germany, France, etc.,	$18,283,315
" 944	3.	Spain with Philippine Islands,	4,123,000
" 379	1.	Belgium with Peru,	6,440,995
" 762	3.	Netherlands with Dutch East Indies,	66,080,000

With United States.

(Atlantic Ports, chiefly New York—Pacific Ports, chiefly San Francisco.)

	CLASS.		
C. & N., 40	2.	British East Indies, Atlantic ports,	$22,765,825
" 49	3.	British East Indies, Pacific ports,	1,432,041
" 39	2.	French East Indies, Atlantic ports,	319,427
" 40	2.	Dutch East Indies, Atlantic ports,	7,042,412
" 40	1.	Hong Kong, Atlantic ports,	2,113,021
" 41	3.	Hong Kong, Pacific ports,	3,050,556
" 39	1.	China, Atlantic ports,	12,484,834
" 39	3.	China, Pacific ports,	6,932,940
" 42	1.	Japan, Atlantic ports,	10,038,673
" 43	3.	Japan, Pacific ports,	9,380,330
" 40	1.	British Australia, Atlantic ports,	13,279,825
" 41	3.	British Australia, Pacific ports,	5,040,316
" 42	1.	Philippine Islands, Atlantic ports,	8,719,069
" 43	3.	Philippine Islands, Pacific ports,	2,053,660
" 42	1.	Hawaii, Atlantic ports,	197,619
" 43	3.	Hawaii, Pacific ports,	16,025,780
" 32	1.	Chili,	4,814,625
" 34	1.	Equador,	1,331,370
" 36	1.	Peru,	1,024,497
" 22 & 24	2.	Central America (Nicaragua, Costa Rica and Salvador),	5,170,980

Pacific Ports of the United States with

	CLASS.		
C. & N., 5	1.	Belgium,	$837,840
" 7	1.	France,	5,632,359
" 7	1.	Germany,	1,136,506
" 6-10	1.	Great Britain,	33,944,476
" 30	1.	Cuba,	535,111
" 35	1.	Brazil,	166,012
		Total,	$825,110,167

(In the table, the trade of Asia, etc., with interior ports of entry of the United States which is chiefly transhipped at San Francisco, is omitted because it is almost entirely in high-priced commodities which yields only a low tonnage. It amounts to $2,305,138.)

C. & N., 45

To this large aggregate there should be added the commerce of the Atlantic and Pacific coasts of the American Continent, each with the other, and any other trade of the Pacific coast not already included. Some portion of the trade referred to now finds its way around Cape Horn, a part goes by the way of the Panama Railroad across the Isthmus, and a considerable portion of it helps to make up the tonnage of the Pacific Railroads. A large part of the Pacific Railroad portion is included in the items of commerce between China, Japan and Australia, and the United States; particularly that part of such commerce as is entered via San Francisco.

In addition to this, there is a large traffic between our Atlantic and Pacific seaboard already established, and likely to increase with such strides as is known to trade and commerce in the Western hemisphere only, as soon as an advantageous waterway is offered for its transportation. It is now limited by the high cost of railroad transportation, or the length of the ocean voyage. The rate for transportation between New York and San Francisco by rail in carload lots is not less than $20 per ton on low class freight, and much higher on general merchandise. By sailing vessels freights are rarely over $10, and more often $8 or $9. The difference in time of transit by existing routes is that between one hundred and twenty days for a voyage around Cape Horn, and fifteen to eighteen days for fast freight by rail across the continent.

From Hong Kong to New York, around the Cape, is about one hundred and sixty-five to one hundred and seventy days, by sailing vessel; by steamer across the Pacific and rail across the continent it is thirty-eight to forty days; by the canal route it would be one hundred days by sail, and thirty-eight to forty days by steamer. Under certain conditions commerce pays the difference in cost to save the difference in time between the quicker and the slower route, for by so doing capital is turned over and made to yield its profit more frequently, the risks of unforeseen contingencies are reduced to a minimum, and the accidents which bring disaster to the merchant are, to an equal extent, avoided. High-priced commodities, such as come to us from Asia and the islands of the Pacific, will bear the additional charge in consideration of the saving of time, but lumber and other low-priced material cannot. Recently the bark "W. W. Crapo" brought from Port Townsend, Washington, a cargo of shingles and spars to Boston, Mass. The "Crapo" is a 1,650 ton bark, and could be run at a cost of, say, *$75 per day, not including port charges. She occupied one hundred and twenty-eight days in her voyage, and sailed sixteen thousand two hundred miles. By the Nicaragua route the distance from Port Townsend to Boston is about five thousand six hundred miles, and the saving about ten thousand six hundred miles; nearly sixty-six per cent, or, say, more than eighty-three days of her passage, which would amount to a saving in actual expense of $6,225, without regard to the advantage to both shipowner and lumber merchant in their

* $75 per day for costs includes interest upon cost of vessel, insurance, depreciation of value, repairs, wages and provisioning.

economies of time, insurance and use of capital, which upon her cargo could not have been less than $40 per day, or an aggregate of $3,300 more.

Under such advantages as the canal would offer, an enormous coastwise commerce in coal, provisions, lumber, and the various commodities of commerce, the traffic in which is largely dependent upon advantageous transportation, would of necessity be developed; the magnitude of which it is impossible to estimate. The same reasons will operate to divert to the canal a very considerable portion of the trans-continental traffic from China, Japan, Australia and the Sandwich Islands, which has been diverted originally from the Cape Horn route, and now constitutes a large part of the tonnage of the Panama or Pacific Railroads. It is in this view of the matter that we have included in the Table of Commerce the traffic between these countries and the port of San Francisco as tributary in a degree to the canal.

There should also be added to the table a proper estimate of the proportion of the commerce between Great Britain and her East Indian Colonies, which will seek the Nicaragua Canal as a return route in preference to the Suez Canal, because of favoring winds and currents, more favorable temperature, and other reasons which the merchant will be quick to discover.

The first item mentioned, Existing Traffic between the Atlantic and Pacific coasts of the continent not otherwise included, has been estimated at figures varying from two hundred and sixty-five thousand five hundred and thirty-one tons in 1887 to two hundred and seventy-five thousand tons in 1888, distributed as follows:

	TONS.
Between Atlantic and Pacific ports of United States around Cape Horn,	145,713
British Columbia with Europe, around Cape Horn, - -	69,818
To which add similar tonnage by the Isthmus of Panama, estimated at	50,000
E. P., 3-24-88. Estimate of 1887, - - - - -	265,531
For 1888 the following estimate has been made:	
By Panama, - - - - - - -	75,000
Between Atlantic and Pacific ports of United States around Cape Horn, - - - - - -	185,000
British Columbia with Canada, around Cape Horn, - -	15,000
	275,000

In this last estimate the trade of British Columbia with Europe is entirely omitted as apparently of no value; we may, however, assume that it was not less in 1888 and 1889 than in 1887, say, seventy thousand tons, and we may safely accept less than the mean of the two years, this included, as a just estimate of the annual amount, say, in round numbers, two hundred and seventy-five thousand tons.

As we have already included in the table of Tributary Traffic the commerce of Asia and the Pacific Islands with San Francisco, we make no separate esti-

mate of the proporton of it which ought to be attracted to the canal, but in the distribution of the total consider it as among the probably tributary business. It is admitted without question that a considerable portion of this trade is directly with the inhabitants of the Pacific coast and for local consumption, but a certain proportion of it is transhipped by rail across the continent for consumption or distribution at points, not ports of entry, and where it cannot be shipped "in bond." This portion of the trade would, because of the comparative cheapness of water transportation, be attracted by the canal; for the difference in time of transit by the canal and that of entry at the Pacific port, re-shipment, and of freight transportation by rail across the continent, would not be sufficient to warrant the additional cost of overland transportation; indeed, it would probably consume quite as much if not more time than the route by the canal. The time from Hong Kong to New Orleans by steamer through the canal, would be less than via San Francisco by steamer, and rail from thence to New Orleans.

The value of the return commerce between Great Britain and her East Indian Colonies remains to be considered. It is possible that the export trade from Great Britain to the East Indies will always seek the route by the Suez Canal, but there are reasons in the favoring winds and currents and more temperate climate to traverse, which make it exceedingly probable that the return voyage may he made more speedily and therefore less expensively, and at the same time more comfortably, by the Nicaragua Canal than by the route used for out-bound trade. It is not impossible, however, that the northeast trades which carried Columbus so successfully to Porto Rico may sufficiently favor the out-bound voyage to attract even some portion of that trade, but there is no room to doubt that the canal will exert an attraction on that which is homeward bound. Moreover, not an inconsiderable part of the material of this traffic, such as plumbago from Ceylon and straw braid from China is immediately transhipped from London to New York for consumption in this country. What part of the export trade will seek the Nicaragua route may be disputed, but of that which now moves to Great Britain from that portion of the world the canal may with reason expect a fair share. The total of these imports into Great Britain from her East Indian possessions amounts to nearly $200,000,000 per annum.

To recapitulate. The amount of traffic, thus indicated, which would be attracted to a greater or less degree, by the Nicaragua Canal to-day, if it were open to business, is briefly:

The aggregate of the table, page 6, - - - -	$825,110,167
The return trade from India and the Straits Settlements to Great Britain, page 14, - - - - - -	195,683,679
Total value, - - - - -	$1,020,793,846
Add to this value the trade of Hamburg with Australia, reported in quantity, page 5, - - - - -	65,300 tons.

The Atlantic and Pacific coastwise trade of the United States and British Columbia and other trade, (not included in table,) page 8, - - - - - - - 275,000 tons.

Amount in bulk, not valued, - - - 340,300 "

It remains to reduce the statistics of value to a tonnage basis and to distribute the whole in such manner as shall clearly show the relative importance of the canal to the parts thus distributed.

"Lev." In the estimate of the Statistical Commission of 1879, it was calculated that 1,000,000 tons of the aggregate of commerce to be regarded as tributary to the canal consisted of flour, guano, and other low-priced commodities, which should be valued at 200 francs, or say $40 per ton. The remainder was valued at 375 francs, or $75 per ton, and the result was the estimate, after liberal allowance made, of 5,250,000 tons already cited.

When the low values of the commodities which constitute the great bulk of material transported are considered, it may well be questioned whether this valuation was not too high, and the allowance for low-priced commodities too small. As corroborating this opinion the following approximate values are submitted.

Coal	is worth say	$3.00	per ton.
Crude Oil	" "	16.00	"
Refined Oil	" "	25.00	"
Sugar	" "	44.00	"
Flour	" "	50.00	"
Wheat	" "	35.00	"
Corn	" "	15.00	"
Guano	" "	30.00	"
Nitrates	" "	3.20	"

S. F. J. C., 90. The wheat and flour fleet from San Francisco carried in 1889, 692,500 tons (over ninety per cent. wheat), mostly to Europe, - - - - - - - 692,500 tons.

S. Y. B., 405. Chili exported in 1888 of Nitrates, - - - - 760,000 "

{ 680,000 of which went to Europe.
{ 80,000 " " the United States.

" Of Guano (estimated from report of value), - - - 40,000 "

" Of wheat (estimated from report of value), - - 150,000 "

Peru exported in the same year,—

S. Y. B., 809. Of Guano, - - - - - - - 14,000 "

" Of Nitrates, - - - - - - 1,773,135 "

And Bolivia exported,—

S. Y. B., 387. Of Nitrates, by way of Arica, Peru (estimated from report of value), - - - - - - - 124,000 "

Making a total of - - - - - 3,553,635 tons.

The statistics of Chili, Peru and Bolivia for 1889 are not yet accessible, but the business was larger than for 1888.

Of this total, over 2,650,000 tons was of nitrates, 1,897,000 tons of which was cubic nitre, worth only about $3 per ton at place of shipment and valuation. Coal and coal oils, crude and refined, enter largely into out-bound freights, and being also articles of low valuation, must materially affect the general average of values. That this tonage, as well as its return freight, or rather the out-bound freight of which it is the return, would be almost entirely tributary to the canal, is evident from the fact that the canal will cut out from the voyage, as between San Francisco, Callao and Valparaiso, and Liverpool, in the first case, 6,996 miles; in the second, 4,090 miles, and in the third case, 2,144 miles, including the stormy, dangerous and destructive* passage around Cape Horn. The difference from Valparaiso, the principal port of Chili, may not be sufficient to counterbalance the charges of the canal, but from Callao and ports north of it, there can be no question as to the advantage to be gained by its use.

pendix A.

Following the method of the Statistical Commission, which, so far, is the best that has been suggested, and modifying it only to pay regard to ascertained facts, we may deduct from the aggregate of the table the following items as not open to estimate, their value and quantity both being already determined:

Wheat and flour from South American ports, (page 10),	150,000 tons	$3,411,532
Guano (page 10),	54,000 "	1,762,389
Nitrates (page 10),	2,657,135 "	30,013,199
	2,861,135 tons.	Value, $35,187,120
J. C., 90. Wheat and flour from San Francisco, (page 10),	692,500 tons	21,527,725
Totals,	Tons, 3,553,635	Value, $56,714,845

We have remaining a valuation of - - - $768,395,322 as the balance of the table on page 6 for which to determine a tonnage equivalent.

For this purpose we have much information that is of importance in relation to averages of value. The total foreign commerce of the United States for year ending June 30, 1889, is reported as follows (merchandise only):

& N., 810. Tons entered, cargo only,	12,913,400	Value of imports,	$745,131,652
" 812 " cleared " "	14,263,430	" exports,	742,401,375
Total tons - -	27,176,830	Total value, - -	$1,487,533,027

Average value, $54.74 per ton.

Complete statistics for Great Britain, France and Germany are as yet accessible only for the year 1888. In that year the commerce of Great Britain with other countries is reported as follows:

* Destructive in its wear and tear upon vessel and rigging.

S. Y. B., 85. Tons entered, cargo only, 27,077,000 Value Imports, - - $386,582,026 S. Y. B., 7
" " cleared, - 31,664,000 " Exports - 298,047,374 "

Total tons, - - 58,741,000 Total value, - - $684,629,400

Average value, £11, 13 s. 2d.=$58.28.

Of France, the commerce is reported as follows, foreign trade by sea,

S. Y. B., 488. Tons entered, cargo only, 13,537,734 Imports value, Fcs., - 3,629,000,000 S. Y. B., 48
" " cleared, - 9,354,225 Exports value, Fcs., - 2,955,000,000 "

Total tons, - - 22,891,959 Total value, Francs, 6,584,000,000

Average value, Francs 288=$57.60.

S. Y. B., 549. Of Germany the only statistics which are in a form available for use are those of the port of Hamburg, which is the principal port of entry of the German Empire. Out of a total tonnage of seventeen million, four hundred and eighty-nine thousand two hundred and thirty-five tons entered and cleared at the seven principal ports of Germany in the year 1888, Hamburg is credited with eight million, eight hundred and forty-six thousand one hundred and seventeen tons, being over fifty per cent. of the whole. For some reason not stated, no return is made of the value of exports, but the value of imports at that port is given as follows:

Y. B., 577. Imports by sea, weight, - - 3,884,422,400 kilos.
Exact equivalent, - - - 3,823,786 tons.
Value, - - - - 1,114,906,000 marks.

Average value, Marks 291=$72.75.

We have then—

Great Britain, - - -	58,741,000	tons at	$58.28 per ton.
France, - - - -	22,891,959	"	57.60 "
Germany, Hamburg (imports only),	3,823,786	"	72.75 "
United States, - - -	27,176,830	"	54.74 "
Total, - - -	Tons, 112,633,575	Average value,	$57.77.

Statistics of the commerce of the British colonies in Australia and New Zealand may be regarded as free from exaggeration of the repeated entries and clearances, before mentioned as vitiating returns of tonnage on the Pacific Coast. From them we gather the following data:

Commerce of New Zealand in 1888:

S. Y. B., 254. Tons entered, cargoes, - - 456,237 Value of imports, exclusive of specie, - - - £5,430,050 S. Y. B., 25
" " cleared, " - 524,874 Value of exports, exclusive of specie and gold, - 6,487,897 "

Total tons, - - - 981,111 Total value, - - £11,917,947

Average value £12, 3s.=$60.75.

The commerce of Queensland, Australia, in 1888 was:

S. Y. B., 262.	Tons entered,	478,517	Total imports,	£6,646,738	S. Y. B., 261.
"	" cleared,	517,712	" exports,	6,126,362	"
	Total tons,	996,229	Total value,	£12,773,100	

Average value, £12, 16s., 5d.=$64.10.

The commerce of Victoria in 1888 was:

S. Y. B., 286.	Tons entered,	2,182,071	Total imports,	£23,972,134	S. Y. B., 284.
"	" cleared,	1,125,812	" exports,	13,853,763	"
	Total tons,	3,307,883	Total value,	£37,825,897	

Average value, £11, 8s., 5d.=$57.10.

The commerce of New South Wales in 1888 was:

S. Y. B., 237.	Tons entered,	2,414,750	Total imports,	£20,885,557	S. Y. B., 235.
"	" cleared,	2,350,669	" exports,	20,859,715	"
	Total tons,	4,765,419	Total value,	£41,745,272	

Average value, £8, 15s., 5d.=$43.85.

In the returns of the Australian Colonies, the tonnage of vessels arriving and clearing in ballast, and of specie and bullion exported and imported are not separated from the general aggregates, and make the averages of tonnage valuation obtained from them less useful than those obtained from the commerce of the four great nations, but the including of specie and bullion in export values, overbalances the including of vessels entered and cleared in ballast, and the tendency is to make an increased average value. This is demonstrated by the returns of New Zealand as compared with those of Victoria and New South Wales. They serve, then, notwithstanding their defects, to corroborate the other estimates in a general way, although they are not of specific value in themselves.

The commerce of New Zealand, of which the statistics are properly divided, showing the tonnage of cargoes entered and cleared and the values of imports and exports exclusive of specie, bullion, and gold and silver, shows an average value of $60.75 per ton. It embraces in its aggregate all the commodities in similar proportions, which go to make up the commerce of other Australian countries, and its average, therefore, is of direct value.

Deducting from the total tonnage and the total value of the commerce of Europe, which amounts to 85,456,745 tons, at a valuation of $5,018,674,000, the total tonnage and value of the nitrates, wheat, etc., say 3,553,635 tons, valued at $56,714,845—(page 11)—which goes almost entirely to Europe, and which has been deducted similarly from the table of values, the average value per ton of the remainder is $60.59.

From these data, which approximate each other so closely, we may safely assume $61 to be a full valuation for determining the equivalent tonnage of the

$768,395,322, remainder of the Table of Tributary Commerce. We have then the following results:

	TONS.
Equivalent of $768,395,322, $61 per ton, average value,	12,596,644
Tonnage of Hamburg with Australia, not appraised in table,	65,300
Tonnage of nitrates, etc., South America,	2,861,135
Tonnage of wheat and flour, San Francisco,	692,500
Tonnage between Atlantic and Pacific costs, U. S. A. and British Columbia, etc,	275,000
Tons,	16,490,579

To this must be added an estimate of the export tonnage from Asia to Great Britain. As many commodities of high value, such as teas, silks and spices, enter more largely into this trade, in order to convert its value we may properly advance the tonnage equivalent. $100 per ton will be sufficient valuation.

The exports to Great Britain for the year 1888, from the following countries, were as below:

S. Y. B., 139	From India,	£30,763,677 =	$153,818,335
" 104	" Ceylon,	2,532,999 =	12,664,995
" 158	" Straits Settlements,		29,200,349
	Value,		$195,683,679
	Equal, at $100 per ton, to		1,956,837 tons.
	To which add tonnage already estimated,		16,490,579 "
	Add for increase of coal oil exports to Japan, China, etc., see page 18,		237,934 "
	Aggregate tonnage,		18,785,350

We have thus 18,785,350 tons as the aggregate of the enormous traffic which exists to-day, to a greater or less degree, within the zone of attraction of the proposed canal. We have now to consider in what varying measure and to what extent this traffic will be attracted.

It will not be questioned that the trade of the Pacific coast, at least from Callao north, with the United States and with Europe, will seek the canal as its most advantageous route, provided charges for its use are not prohibitory. The difference in distance between Callao and Liverpool or Plymouth by ordinary sailing route and by the line of the Nicaragua Canal is four thousand and ninety nautical miles. Allowing one hundred and ten miles per day as the average capacity of a sailing vessel of two thousand tons register, and double that, or two hundred and twenty miles per day for a freight steamer of like capacity, this saving of distance is equivalent to a saving of thirty-seven days' time for a sailing vessel, or eighteen and a half days for a steamer.

Appendix A.

As the increased capacity and speed of the steamship is proportionately counterbalanced by increased original cost and increased expense of operation, perhaps a full illustration of one class of vessel will be sufficient to warrant an arbitrary statement of premises concerning both.

A sailing vessel of two thousand tons register will cost for construction, equipment, etc., etc., about $60 per ton, say $120,000.

Twenty-four per cent. per annum is the usual allowance of cost for the following items:

For interest on cost,	6 per cent.
Insurance,	8 "
Annual depreciation, etc.,	10 "
	24 "

Charge for these items, instead of twenty-four per cent., say, twenty per cent.=$24,000 per annum, or $66.40 per day.

For wages and subsistence the cost will be about $1,000 per month, or, say, $33.33 per day. Total, say, $100 per day.

But such a vessel on a long voyage will lie from thirty to sixty days in port loading and discharging cargo, and this time is equally chargeable to the voyage. Allowing, then, one hundred and twenty days as sailing time between New York or Liverpool and San Francisco by way of Cape Horn, and forty days in port (less than the average) we have one hundred and sixty days for the voyage at a cost of $100 per day, $16,000

Add port charges, say, 4,000

Total cost, say, $20,000

Freights pay from $7 to $10 per ton, according to market; assuming $8 as a low rate, a two thousand ton vessel will earn on her cargo of about three thousand tons,

Say, $24,000

Deduct expenses, 20,000

Profit, at low estimate, per voyage, $4,000

The following is an estimate of the saving which would be made by the use of the canal between the ports of San Francisco and Liverpool:

	MILES.
Appendix A. Distance from Liverpool to San Francisco, by Cape Horn,	14,690
" " " by Nicaragua route,	7,694
Distance saved,	6,996

Equal to, at one hundred and ten miles per day, more than sixty-three days; that is to say, sixty-three one-hundred-and-sixtieths of the expenses of the voyage may be saved, or about $6,300, to which must be added an equal proportion of the profits of the voyage because of the increased voyaging capacity through lessened dis-

tance, say, $1,580, showing $7,880 as the immediate advantage to the shipowner alone of the use of the canal between San Francisco and Liverpool; at higher freight rates the advantage would be proportionately increased—but there are other advantages which cannot be so easily computed, yet which will be of great weight in turning the current of trade into this new channel. The increased safety of the voyage and reduced rates of insurance to both shipowner and merchant, and with the merchant, the ability to turn his capital so much more frequently, are arguments of the weightiest importance, which cannot be measured by dollars and cents in anticipation, except theoretically, yet added to the facts before stated which are ascertainable, they serve to multiply the evident advantages of the canal route.

There can be no question as to the advantage of the canal to Northern ports; there may be some as to how far South it may be considered preferable to the route around Cape Horn. We do not doubt but that its influence will be felt much farther than is demonstrable, but it is better not to claim too much, for that which can clearly be claimed is abundantly sufficient to satisfy the most exacting enquirer.

We ask attention to the following facts concerning the nitrate trade:

Cubic nitre is worth at place of production, say, from $3 to $3.23 per ton, a low-priced commodity, and freights by sailing vessels are about 32s. 6d. to
S. Y. B., 809. 40s., say, $8 to $10. In 1888, Peru shipped to Great Britain, 1,773,135 tons from the different ports along the coast from Callao to Iquique.

Appendix A.

The distance from Callao to Liverpool, by Cape Horn, is -	10,539 miles.
By Nicaragua Canal route it is - - - -	6,449 "
Distance saved, - - - - -	4,090 "
Time saved at one hundred and ten miles per day, thirty-seven days out of a voyage of, sailing days, - - - -	96 days.
In port, - - - - - - -	40 "
	136 "
Estimating expenses as before, at $100 per day,	
They amount to, - - - - - - -	$13,600
Port charges, say, - - - - - -	4,000
Total, - - - - - - -	$17,600
Freight, three thousand tons, at $8, - - - -	24,000
Profits of voyage, - - - - -	$6,400
We have the following as the advantage by use of the canal route:	
37-136 of expenses saved, - - - - - -	$3,700
37-136 of profits to be added, - - - - -	1,800
Gain, - - - - - - - -	$5,500

Allowing a charge of $2.50 per registered ton as the canal toll, it would pay the ship-owner at least $500 to use the canal coming from a port as far south as Callao. To vessels from ports within that limit, and to vessels of less tonnage the ratio of advantage would be proportionately greater. The advantage to the shipper may be computed as follows: Allowing such a ship's cargo (2,000 tons register), to be worth $150,000—that is to say, at the rate of $50 per ton for the cargo carried, which is much below the average, the saving in interest, at six per cent. per annum, and insurance at four per cent. per annum, for the thirty-seven days, would be over $1,500, to be added to the $500 advantage to the ship-owner. On a cargo valued only at $50,000, which would necessarily be made up very largely of nitrate at a low valuation, the saving would be $500 to the shipper, the advantage to the ship-owner being the same in either case.

In view of these facts, we may regard the trade of Peru and of the Pacific coast of the American Continent north from Callao as entirely tributary to the canal. South of Callao it will become gradually less so until canal tariffs overbalance its benefits, but exactly at what point the division will take place only experience can determine.

It does not seem that further illustrations are necessary; the same methods may be applied to any and every case in which it may be desired to test the advantages of the canal; but investigation shows that where the saving in distance approaches 2,800 miles for a 2,000-ton vessel with a cargo worth $150,000 or over, there will be an advantage to the ship-owner and the shipper conjointly, in the use of the canal at a toll of $2.50 per registered ton. To decrease the rate would extend its influence still farther and increase the tributary tonnage in more than a proportionate rate, for the added zone of attraction would be on the outside of an already widely extended circle, stretching out into rich and densely populated territory in Asia. Even at $2.50 per ton it is not impossible that the difficulties of the passage around Cape Horn and advantages of insurance, etc., etc., may bring the trade of Valparaiso as well as of Callao within the zone of strong attraction; we have, however, preferred to treat it, so far as Europe is concerned, as belonging to a class likely to contribute to the canal not more than one-fourth of its volume.

If it be asked: How shall the shipper and the merchant avail himself, each of his respective share, of the advantage to accrue? The answer is: As they have done in the past.

A quarter of a century ago the merchant bought his teas in Hong Kong or elsewhere, insured and shipped them home; each transaction was the subject of a separate negotiation. To day he buys them at what is known in New York as a C. F. and I. price, that is to say, Cost, Freight and Insurance included. The shipper profits by any reduction in insurance or freight which he may be able to obtain, and adjusts his price with reference to it and to promptness of delivery. On the other hand the buyer suffers no risk of change in freight rates nor any of

the embarrassments and costs of rehandling at any intermediate point. This new method of purchase and sale has grown up entirely in connection with the requirements of trans-continental traffic. In like manner trade will provide a satisfactory method to profit by any advantage properly belonging to herself in connection with the canal; probably by a C. T. and I. price, that is to say Cost, Tolls and Insurance included, or, if not in that way, then by some more suitable method.

It will aid in arriving at a proper distribution of the traffic if we divide it into three classes, considering the facts just illustrated.

1st Class—That which will be *entirely* tributary to the canal.

2d Class—That which will be *largely* tributary, and,

3d Class—That which will be so *partially* and perhaps only in a small degree.

In making the distribution we make use of data already given.

In the first class, that of *entirely* tributary commerce, we place the following:

	TONS.	
Trade between Atlantic and Pacific ports, United States, etc., not included in table of values; estimated at - - -	275,000	
Trade of Pacific ports with Great Britain, France, Germany, Belgium, Cuba and Brazil, tabulated at $42,252,304. (In this total is included the value of the wheat export from San Francisco.) It should, therefore, be divided as follows:		
$21, 527,725 wheat and flour, reported at - - -	692,500	
$20,724,579 estimated at $61 per ton, - - -	339,747	
Trade of Atlantic ports of the United States with Hong Kong, China, Japan, British Australasia, Philippine Islands, Hawaii, Peru, Equador and Chili, amounting to $54,003,533. This also may be divided as follows:		
$6,456,448 for coal oil, - - - - -	322,626	C. & N.,
$47,547,085 estimated at $61 per ton, - - -	779,460	
(The division is made for the purpose of adding the increase of coal oil shipments for the years 1889-1890, which were over 50 per cent. greater than those of 1888-1889 as shown by British consular reports of receipts in China, Japan and British East Indies.) Add, therefore, for existing coal oil traffic, 1889-1890, 50 per cent. of 322,626 tons, - - - - -	161,313	
Coal Oil to British, French and Dutch East Indies from Atlantic ports for 1888-1889, - - - 343,242 tons,		See Secc Class C. & N.,
Add 50 per cent. increase 1889-1890, 176,621, -	519,863	
(United States Government Reports give the export of coal oil, crude and refined, to the countries named for 1888-1889 at 665,868 tons. Messrs. Frazar & Co., of Yokohama, show an increase of shipments received in China, Japan and British East		

Indies during 1889-1890 of 294,937 tons, or over 61 per cent. increase.) TONS.

Trade of Great Britain with Equador, Peru and Bolivia, amounting to $19,003,610. This must also be divided as follows:

$5,225,170 for nitrates and guano, - - - - 1,911,433

$13,778,390 estimated at $61 per ton, - - - 225,884

Trade of Belgium with Peru, $6,440,905 at $61 per ton, - - 105,589

Total 1st class entirely tributary, tons, - - 5,333,415

2d Class—LARGELY TRIBUTARY.

General business between British, French and Dutch East Indies and New York, $30,127,664. TONS.

Of this total a part has already been considered as belonging to Class 1, viz: The exports of coal oil from Atlantic ports of the United States; there is, therefore, to be deducted $6,275,800 for its value, leaving $23,841,864 which, at $61 per ton is equal to 390,850 tons, of which we may assume one-half as tributary, - 195,425

The trade of Central America with the United States will also take place in this class. In 1889 it amounted to $5,170,980, at $61, equal to 84,770 tons, but as much of it is coastwise with San Francisco, and considerable of it fruit from the Carribbean coast to New Orleans and New York, we may take one-quarter only as tributary; say, - - - - - - 21,192

The trade of Great Britain with Hong Kong, China, Japan, the Australian Colonies, New Zealand, Tasmania, Philippine Islands, Chili and Central America, will be attracted in proportion to distances. It amounts to $457,059,308. This should be divided as follows:

Exports of nitrates, guano and wheat, value, - $29,962,470 = 950,000 tons.

Remainder, - - 427,096,838 at $61 = 7,001,588 "

7,951,588 tons.

Take one-quarter, - - - - - - 1,987,899

Trade of France with New Caledonia, Japan and Chili amounts to $27,184,683, at $61 equal to 445,650 tons; take one-quarter, 111,412

Trade of Germany with Australia, Japan and Chili amounts to $29,106,392, at $61 equal to - - - 477,154 tons.

Add Hamburg with Australia, - - 65,300 "

542,454 tons.

Take one-quarter, - - - - - - 135,614

	TONS.
China with Germany, France and Europe, $18,283,315, at $61, equal to 300,000 tons; take one-quarter,	75,000
Total 2d Class,	2,526,542

3d Class—PARTIALLY TRIBUTARY.

In this class we may include:—

Trade of Spain with Philippine Islands,	$4,123,000
Trade of Netherlands with Dutch East Indies,	66,080,000
Trade of Great Britain with Java,	22,358,760
Trade of San Francisco with China, Japan, etc.,	43,915,593
Total,	$136,477,353
At $61 equal to,	2,237,333 tons.
To which add for British imports from India, Ceylon and Straits Settlements, as estimated,	1,956,837 "
Total,	4,194,170 tons.
Of which take one-sixteenth, total 3d Class,	262,136

SUMMARY.

1st Class—Entirely Tributary,	5,333,415
2d Class—From tonnage Largely Tributary,	2,526,542
3d Class—From tonnage Partially Tributary,	262,136
Tons,	8,122,093

This is an approximate estimate of the tonnage existing in 1889 and to-day, which the canal might expect to control if it were open for traffic.

M. Levasseur and his associates in 1879 estimated that the tributary tonnage which might be anticipated for 1889 was 7,250,000. Facts more than confirm their expectations, and demonstrate the propriety of their method.

A study of the Table of Distances appended,* and a consideration of the influences operating, will show the principle upon which the division into classes has been made In taking the fraction of the respective aggregates which the second and third classes may be expected to contribute, we have claimed less, rather than more, than a reasonable expectation would allow. It is with regard to the third class only that any explanation seems necessary as to the reasons which have suggested the claiming a portion of it as tributary. A majority of the trade in this class originates beyond the recognized dividing line of 110° East from Greenwich, especially the trade of India, and cannot be expected to pay any large tribute to the canal, except perhaps at a rate as low as that of the Suez Canal, whereas we have assumed $2.50 as the probable toll. The tolls of the Suez Canal, all charges included, amount at present to about $1.96 (Fcs. 9.80) per registered ton. The trade of the Philippine Islands with Spain is not

* Appendix A.

open to the same objection, but, on the other hand, her Mediterranean ports are nearer than the Atlantic ports of that country or of Europe. We have referred to the prevailing winds and ocean currents, and the more favorable temperature of a passage by the Nicaragua Canal rather than by the Red Sea and Suez; these are reasons of some importance in controlling direction. In addition to these reasons much of the business considered is carried in sailing vessels which do not go by the Red Sea route at all; they have to double one or the other of the Capes. To them the Nicaragua Canal and prevalent winds and currents will afford advantages which to a steamer might not be of so great importance. Moreover, there is a large traffic which now goes from this region, first to England or other parts of Europe and comes to us from thence, which, when the canal is open, must and will come direct. Large quantities of plumbago used in the foundries throughout our country is carried from Ceylon where it is mined, to England and then sent here to supply our needs; thousands of tons of straw braids from China, and other commodities from other parts follow the same route. These are the sufficient reasons for assuming to claim a portion and we have claimed only a very small portion, of the enormous trade of these remote points.

Thus far we have considered the question with reference only to what exists to-day, and our conclusions are based upon statistics for the years 1888 and 1889. Allowing that the canal will be ready for traffic in the year 1897 and admitting our estimates to include all increase realized in 1889 by the countries whose statistics are given only for 1888, we have eight years growth of commerce to make allowance for, in estimating the amount of business which at the opening of the canal will be ready for transit.

For the ten years of which 1888 was the last, the commerce of the four great commercial nations shows the following increase:

	1879.	1888.
Great Britain, . .	2,977,204,200	3,336,087,844
France, . . .	1,917,186,874	1,830,682,200
Germany, . .	1,841,726,925	2,306,258,318
United States, .	1,278,762,621	1,417,172,421
Total, . . .	8,014,880,620	8,890,200,783

Increase, 875,320,163, or about 10 9-10 per cent.; prices of staple commodities have changed but little during the time, except that wheat is about 10 cents per bushel lower, but they have rather declined than advanced. The tonnage equivalent would therefore not be materially changed. We may then estimate the advance for the years 1888 to 1897, both years included, say nine years, at 10 per cent. But this is only normal growth, and for reasons worthy of consideration, we have the right to expect more than a normal growth of the commerce to which the Nicaragua Canal will afford a means of transit.

With the opening of the canal not only will a new route be provided, but new fields will be opened for commerce as well as more advantageously provided for.

The products of our Alaskan possessions, as well as of Washington and Oregon, mostly low-priced commodities furnishing a large bulk of tonnage, will be brought at less cost to eastern markets, the markets of the western coast of South America will be opened to the low-priced coals of our South Western States, and the coasting trade now carried on with the West Indies to the extent of over 500,000 tons per annum will be multiplied beyond calculation. If a traffic of 500,000 tons has been developed within the limits of the Carribbean Sea, what may be expected when the markets of the Pacific Coast of Columbia, Mexico and Central America, of the States of Equador, Peru, Bolivia, Chili and of Southern California are opened to easy access for our coasting vessels?

In our existing lake and coastwise trade, steel barges carrying from 1,500 to 3,000 tons freight transported by powerful tugs, are taken at low cost to market points, and there left to discharge and reload for a return voyage, while their motive power returns without delay with freights, in similar barges, made ready for departure before its arrival. Thus, movement of freight is accelerated, invested capital is made to yield its largest returns, shippers profit by the possibility of lowered rates and consumers by the possibility of lowered prices. Under such methods the traffic of the Sault St. Marie Canal has developed from 1,802,571 tons in 1881 to the enormous aggregate of 7,221,935 tons in 1889 and is exceeding the ratio of that year, for 1890. And this traffic has grown up in connection with the internal trade only of a portion of our Northwestern States with the East. Like results will follow similar methods, which are equally possible in the waters opened by the Nicaragua Canal, and American enterprise will not be slow to avail itself of the unprecedented opportunity. What people ever have had such an opportunity put before them? To-day England is practically as near the markets of western South America as we; to-morrow we shall be 7,000 miles nearer than she is to-day in a distance of 10,600 miles by existing routes. We shall still have the advantage over her of the Atlantic's width when the canal is opened, nearer by so many miles to a market for our cotton goods and manufactures of every kind, with machinery, agricultural implements, furniture, woolen goods, carpets and coal to sell, and the needs of 75,000,000 of people at home to furnish a reciprocal market for the products which they have to offer us. But this is not all, perhaps only the smaller portion of the whole. We have only briefly mentioned the products of our own possessions north of California, the forests and fisheries of Oregon, Washington and Alaska, and the products of British Columbia.

The salmon pack of British Columbia, Alaska, Washington, Oregon and California amounted in 1889 to 1,683,800 cases, about 84,200 tons, valued at $9,064,000, exceeding in quantity the pack of 1888 by 527,000 cases; 680,000

cases of the product was from Alaska, and 422,000 from British Columbia. This is a growing industry. The pack amounted in 1880 to only 679,490 cases; in ten years it has increased nearly 250 per cent.; by 1897 at the same ratio of increase it will amount to nearly 3,500,000 cases. Hop growing as an industry was commenced in Oregon and Washington in 1865. Last year the product was 70,000 bales, regularly quoted and competing with other goods in the New York market. The fur-seal and whale fisheries are also growing and important industries.

The cultivation of India-rubber in Central America and on the western coast of California is already attracting attention. The increasing demand for the gum and the destruction of trees in their natural state by the reckless huleros or native gum gatherers, makes attention to an artificial supply for future demands of manufacture imperative. Already large manufacturing corporations in this country are making plantations to meet it. The huleros are so careless that not only are they destructive of the trees but much of the gum brought by them to market is in bad condition and commands only 26 cents per lb., whereas, when properly collected it is worth as much as 80 cents for the best quality. The tree grows naturally in Central America and Mexico. The western coast of the last named country, between the ocean and 1,800 to 2,000 feet of elevation above the level of the sea, seems particularly favorable to its best development. A plantation is made with shoots gathered in the forests, and with proper care will be in condition to yield a crop in six or seven years; a tree in good condition yields 10 to 12 pounds per annum, and, if not maltreated, continues to yield year after year, apparently without limit. Its yield is worth, according to quality—which depends chiefly upon its treatment —from 50 cents to 80 cents per pound. This, too, is an industry which will pay tribute to the canal.

But in the forests of the north-western Pacific Coast there is material which needs only the facilities of the canal for its transportation to a favorable market to yield a tonnage, which alone will probably exceed that of all other industries combined. The wonderful growth of the lumber trade of that section under present limitations of transportation is an indication of the magnitude to which it will grow with the opening of new and more extended markets by the shortening of distances to them on lines within the still waters of the Temperate and Torrid Zones, instead of by the routes now existing through the tempestuous seas of the Storm Zone.

24-'88. In 1886 the shipment of lumber from Oregon amounted to 6,000,000 feet, equal to 12,500 tons; in 1887, to 48,000,000 feet, equal to 100,000 tons. In 1888 the amount cut amounted to 706,985,000 feet, and the shipments abroad to 471,325,000 feet, equal to 981,925 tons, or nearly 1,000,000 tons.

Concerning the lumber trade with Eastern markets, the *Post-Intelligencer*, of Seattle, Washington, publishes the following under the dates indicated:

July 11th. The Sound sawmills (Puget Sound) have lately been filling

special eastern and southern orders for extra length stuff. Quite a large number of huge spars have been lately shipped from Sound ports to the East where there is ever an active market sale for that material.

July 14th. The Puget Sound cedar shingles were first entered in the eastern markets five years ago. The demand for them has ever since steadily increased, and now shingle mills all over the Sound are shipping their product east as far as Ohio (*i. e.*, at railroad rates).

The forests of Maine no longer yield the timber needed for masts and spars of large vessels. In the forests of Oregon trees grow to 12 feet in diameter and 300 feet in height. The average length of the sticks brought to Boston from Puget Sound by the bark "Crapo," in the cargo, the arrival of which has been already mentioned, was 126 feet, and their average diameter 39 inches. Sixty of the sticks were bought by a shipbuilder of Bath, Maine, and were made into a raft and towed around to his yard. This fact shows how depleted the Maine forests are of spar timber. Cuba has attempted the importation of lumber for building purposes around Cape Horn, but found the experiment too costly to be continued. In our Southern States their own hard pine, though less desirable, is taking the place of soft pine because of advancing prices. All these demands will be met and supplied from the Oregon and Washington lumber fields with the opening of the canal. Any estimate of what the demand and supply would aggregate is mere conjecture, but considering as a whole, the coastwise trade, including the mahogany, rosewood, ironwood and teak of Southern Pacific coasts, the growing trade of Central America in coffee, cocoa, India-rubber, mahogany, and other hard woods, the furs of Alaska, and the seal fisheries, whale oil, wheat, canned salmon and other products of British Columbia, Washington and Oregon, spar timber and other lumber from the forests, and our out-bound trade in coal. textile fabrics, agricultural implements, machinery, iron goods, etc., etc., 1,000,000 tons per annum will seem a very small estimate to put upon it.

Aggregating the various items thus estimated we have the following:

SUMMARY

Of trade which will be subsidiary to the canal at its opening.

Traffic existing in 1889 as estimated (page 20), . .	8,122,093 tons.
Natural growth of same by 1897 (10 per cent.), . .	812,209 "
New business developed by opening of the canal, . .	1,000,000 "
Aggregate, ...	9,934,302 tons.

Which may be considered as traffic properly belonging to the canal, and to be drawn by it from the total of the commerce within the zone of its attraction in 1897.

The aggregate of tonnage within this zone of attraction in 1889, as shown page 14, amounted to . . . . 18,785,350 tons.
Deduct subsidiary traffic existing in 1889 (page 24), . 8,122,093 "

And there remains, ... 10,663,257 tons.
To which must be added 10 per cent. for growth in 1897, . 1,066,326 "

And we have as a remainder, ... 11,729,583 tons.
From which the canal, after its opening, may further add to its traffic in such degree as its tolls and the practical development of other controlling influences may determine.

APPENDIX A.

Table Showing Distances in Miles Between Commercial Ports of the World and Distances Saved by the Nicaragua Canal.

FROM	Via Cape Horn. Miles.	Via Cape of Good Hope. Miles.	Via Nicaragua Canal Miles.	Distance Saved in Miles.
New York to San Francisco,	14,840		4,946	9,894
" " Behring Strait,	17,921		8,026	9,895
" " Sitka,	16,105		6,209	9,896
" " Acapulco,	13,071		3,122	9,949
" " Mazatlan,	13,631		3,682	9,949
" " Hong Kong,	18,180	15,201	11,038	4,163
" " Yokohama,	17,679	16,190	9,363	6,827
" " Melbourne,	13,502	13,290	10,000	3,290
" " New Zealand,	12,550	14,125	8,680	3,870
" " Sandwich Islands,	14,230		6,388	7,842
" " Callao,	10,689		3,701	6,988
" " Guayaquil,	11,471		3,053	8,418
" " Valparaiso,	9,750		4,688	5,062
New Orleans to San Francisco,	15,052		4,047	11,005
" " Acapulco,	13,283		2,409	10,874
" " Mazatlan,	13,843		2,969	10,874
" " Guayaquil,	11,683		2,340	9,343
" " Callao,	10,901		2,988	7,913
" " Valparaiso,	9,962		3,987	5,975

FROM	Via Cape Horn. Miles.	Via Cape of Good Hope. Miles.	Via Nicaragua Canal Miles.	Distance Saved in Miles.
Liverpool to San Francisco,	14,690		7,694	6,996
" " Acapulco,	12,921		5,870	7,051
" " Mazatlan,	13,481		6,430	7,051
" " Melbourne,	13,352	13,140	12,748	392
" " New Zealand,	12,400	13,975	11,349	1,051
" " Hong Kong,	18,030	15,051	13,786	1,265
" " Yokohama,	17,529	15,040	12,111	3,929
" " Guayaquil,	11,321		5,890	5,431
" " Callao,	10,539		6,449	4,090
" " Valparaiso,	9,600		7,436	2,144
" " Sandwich Islands	14,080		9,136	4,944
Spain to Manilla,	16,900	13,951	13,520	431
France to Tonquin,	17,750	15,201	13,887	1,314
Hamburg to Mazatlan,	13,931		6,880	7,051
" " Acapulco,	13,371		6,320	7,051
" " Fonseca,	11,430		5,530	5,900
" " Punta Arenas, Costa Rica,	11,120		5,515	5,605

NEW YORK	to East. Entrance of Nicaragua Canal,			2,021	miles.
LIVERPOOL	"	"	"	4,769	"
HAMBURG	"	"	"	5,219	"
AMSTERDAM	"	"	"	4,994	"
HAVRE	"	"	"	4,874	"
CADIZ	"	"	"	4,220	"
NEW ORLEANS	"	"	"	1,308	"

SAN FRANCISCO	to West. Ent. of Nicaragua Canal,			2,776	miles.
VALPARAISO	"	"	"	2,518	"
CALLAO	"	"	"	1,531	"
PORTLAND	"	"	"	3,219	"
VICTORIA	"	"	"	3,428	"

NOTE.—The distances have been measured by customary routes most convenient for Sailing Ships and slow Freight Steamers.

APPENDIX B.

AUTHORITIES AND ABBREVIATIONS.

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